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The Development of Manufacturing Industry Cluster as an Effort of Economic Improvement Expansion in East Java

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Abstract

This study aims to determine the typology of the manufacturing industry based on the region and the factors which affect manufacturing industries clusters in East Java. The analytical instruments used to verify the typology are Static Location Quotient (SLQ) and Dynamic Location Quotient (DLQ), whereas logistic regression binary analysis model was applied to reveal the causes of manufacturing industries clusters. The results of this study recommend several developments of new clusters for each type of industry which hopefully will increase the efficiency and help the expansion process of economic development in East Java.

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Keywords: Cluster, Manufacturing Industry, Economic Development, East Java.

1. Introduction

The enforcement of the ASEAN Economic Community (AEC) by the end of 2015 will bring significant changes to the manufacturing industry in Indonesia, including in East Java. The free flow of goods and services coming into the East Java will directly affect the existence of the growth of manufacturing industry. Therefore, in order to improve the work performance and efficiency of the manufacturing industry in East Java, a spatially strategic policy formulation for the development of the manufacturing sector based on the potential of each region in East Java is urgently needed. For this reason, it is necessary to study the spatial analysis and linkage regency / city in the

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development of the manufacturing industry cluster in East Java province. This step will be a contributive effort to support the acceleration of both medium and long term economic growth.

Theoretically, the cluster development concept is in line with the theory of a new industrial regencies, characterized by specialized and flexible firms, prototype form of urban areas such industrial clusters have been found in metropolitan areas, particularly the Greater Jakarta (Jabodetabek) and Greater Surabaya.

Clustering is a prominent feature of the manufacturing industries. Cluster is generally defined as a geographical concentration of the same manufacturing sub-sectors. The study of literature refers to the term network that covers the majority of small businesses and home industries which are spatially clustered. It is called as industrial regencies in the literature. "Regencies" or "regional / local" became the focus of a study on how and in which leading sectors are located and grouped.

For this intention, it is important to conduct a research on strategic development of leading sectors cluster mapping by identifying the potential maps and the leading sectors of each regencies / cities in the region. The cluster maps of the leading sectors are not only useful as a reference for public and private investment but also can be used as the media to inform the regional potential and the development opportunities. In the short term, these efforts are expected to encourage increased investment (foreign direct investment), whereas in the long term they will also support the accelerated development of each regencies / city in East Java.

Marshal (1919) defines cluster as a group of production activities that are highly spatially concentrated and mostly specialized on one or two main industries only. While Porter (1998) argues that clusters are firms which are partially concentrated and industrially interrelated. Further, Nadvi and Schmitz (1999) state that cluster is a geographical concentration which is formed of backward linkages, forward linkages, vertical linkages and labor linkages.

More complete of cluster concept was proposed by Kolehmainen (2002), who classifies clusters based on different types of externalities and the different types of orientation and policy interventions, ie. (A) The Industrial Regencies Cluster, also known as Marshalian Industrial Regencies is a collection of companies in the industry that are specialized and spatially concentrated in a certain region (Marshall, 1920); (B) The industrial complex clusters, based on the relationship between the identified and stable companies embodied in the spatial behavior in an area; (C) The Social Network cluster is a natural context that is formed because of the informal relationships and social capital in the form of trust, because it is the one that shapes and maintains through social and historical similarities and continuously doing activities together and sharing (Harrison, 1992).

2. Research Methods

The scope of this study included the following stages: *First*, analysis of the potential industry of each region (regencies / city) in East Java which has the potential to be constructed and developed into a competitive and high economic value leading industry. The analysis instruments were: (a) Location Qoutient; (B) Growth Ratio Model. *Second*, the analysis of the spatial pattern of industrial concentration. *Third*, analysis of the factors affecting the industrial areas by using multiple regression analysis.

3. Results and Discussion

3.1. Typology Analysis of Industrial Clusters

The initial part of this study will analyze the location of leading industry in East Java. This industry is based on the results of the Static Location Quotient (SLQ) and Dynamic Location Quotient (DLQ) analysis. The results of SLQ can be called by Base Sector, it is a sector which relatively has contributed above the average compared to other sectors. While the results of the DLQ can be called by Potential Sector, it is a sector that relatively has higher growth level compared to other sectors.

The combination of Base Sector and Potential Sectors are classified into four typologies, namely: (1) Prime Industry is a basis sector and; (2) Growth Industry is not a basis sector, but potential sector; (3) Potential Industry is a basis sector, not a potential sector; (4) Underdeveloped Industry is not a basis sector and potential sector.

3.1.1. Food, Beverages, and Tobacco Industry

Based on the analysis on food, beverage, and tobacco industry; the researcher was able to classify some areas into the following categories: *First*, the prime industries were found in the regencies of Pacitan, Blitar, Malang, Lumajang, Bondowoso, Situbondo, Probolinggo, Pasuruan, Kediri, Bojonegoro, Pamekasan, and Sumenep. *Second*, the growth industries were located in the regencies of Trenggalek, Tulungagung, Madiun, Jombang, Lamongan, Blitar city, and Batu city. *Third*, the potential industries were existed in the regencies of Ngawi, Magetan, Nganjuk, Jember, Banyuwangi, Bangkalan, Kediri city, and Malang city. *Fourth*, the underdeveloped industries were seen in Ponorogo, Mojokerto, Sidoarjo, Surabaya, Gresik, Tuban, Sampang, Pasuruan and Probolinggo city.

3.1.2. Textile, Leather goods and Footwear Industry

Another investigation which focused on textile, leather goods, and footwear industry resulted in the following grouping: *First*, the prime industries were found in the regencies of Pacitan, Magetan, Lamongan, Gresik, Bangkalan, Pamekasan, Probolinggo city, Mojokerto city, and Batu city. *Second*, the growth industries were located in the regencies of Trenggalek, Malang, Lumajang, Banyuwangi, Situbondo, Probolinggo, Nganjuk, Madiun, Bojonegoro, Tuban, Blitar city, Malang city, and Pasuruan city. *Third*, the potential industries were existed in the regencies of Tulungagung, Ponorogo, Mojokerto, Sidoarjo, and Sampang. *Fourth*, the underdeveloped industries were discovered in the regencies of Blitar, Jember, Bondowoso, Pasuruan, Kediri, Jombang, Ngawi, Surabaya, Sumenep, Kediri City, and Madiun city.

3.1.3. Wood Industrial and Other Forest Products

Meanwhile, the study on wood industrial and other forest products concluded the following clusters: *First*, the prime industries were found in the regencies of Pacitan, Trenggalek, Blitar, Lumajang, Bondowoso, Pasuruan, Mojokerto, Jombang, Ponorogo, Magetan, Madiun, Ngawi, Bojonegoro, Lamongan, Bangkalan, Sampang, Pamekasan, Sumenep, Probolinggo city, and Pasuruan city. *Second*, the growth industries were located in the regencies of Tulungagung, Malang, Jember, Banyuwangi, Situbondo, Probolinggo, Kediri, Nganjuk, Tuban, Sidoarjo, Surabaya city, Kediri city, Malang city, Madiun city, and Mojokerto city. *Third*, the potential industries were existed in the regencies of Gresik. *Fourth*, the underdeveloped industries were discovered in the regencies of Blitar city.

3.1.4. Paper and Printing Industry

The research on paper and printing industry revealed the following classifications:
First, the prime industries were found in the regencies of Kediri, Nganjuk, Sidoarjo, and Bangkalan. *Second*, the growth industries were located in the regencies of Tulungagung, Malang, Lumajang, Situbondo, Pasuruan, Jombang, Magetan, Ngawi, Bojonegoro, Lamongan, Gresik, Pamekasan, Blitar city, Malang city, Batu city, Probolinggo city, Pasuruan city, Kediri city, and Mojokerto city. *Third*, the potential industries were existed in the regencies of Bondowoso, Probolinggo, Ponorogo, and Mojokerto. *Fourth*, the underdeveloped industries were discovered in the regencies of Pacitan, Trenggalek, Blitar, Jember, Banyuwangi, Madiun, Tuban, Surabaya, Sampang, Sumenep, and Madiun city.

3.1.5. Fertilizer, Chemical and Rubber Products Industry

In terms of fertilizers, chemicals, and rubber products industry, the study showed the following findings: *First*, the prime industries were found in the regencies of Ngawi and Gresik. *Second*, the growth industries were located in the regencies of Blitar, Situbondo, Madiun, Blitar city, Mojokerto city, and Madiun city. *Third*, the potential industries were existed in the regencies of Tulungagung, Jember, Ponorogo, Nganjuk, Sidoarjo, and Probolinggo city. *Fourth*, the underdeveloped industries were discovered in the regencies of Pacitan, Trenggalek, Malang, Lumajang, Banyuwangi, Bondowoso, Probolinggo, Pasuruan, Mojokerto, Jombang, Kediri, Magetan, Bojonegoro, Tuban, Lamongan, Surabaya city, Bangkalan, Sampang, Pamekasan, Sumenep, Malang city, Batu city, Pasuruan city, and Kediri city.

3.1.6. Cement and Non-Metallic Minerals Products Industry

The examination on cement and non-metallic mineral products industry found the following classifications: *First*, the prime industries were found in the regencies Pacitan, Trenggalek, Blitar, Ngawi, Tuban, Lamongan, Sampang, and Probolinggo city. *Second*, the growth industries were located in the regencies of Situbondo, Probolinggo, Blitar city, and Mojokerto city. *Third*, the potential industries were existed in the regencies of Ponorogo, Magetan, Madiun, Bojonegoro, Gresik, and Batu city. *Fourth*, the underdeveloped industries were discovered in the regencies of Tulungagung, Malang, Lumajang, Jember, Banyuwangi, Bondowoso, Pasuruan, Mojokerto, Kediri, Nganjuk, Jombang, Surabaya city, Malang city, Kediri City, Pasuruan city, and Madiun city.

3.1.7. Basic metals, Iron, and Steel Industry

The observation on basic metals, iron, and steel industry generated the following groupings: *First*, the prime industries were found in the regencies of Lumajang, Sidoarjo and Surabaya city. *Second*, the growth industries were located in the regencies of Tulungagung, Blitar, Jember, Banyuwangi, Pasuruan, Nganjuk, Ngawi, Bangkalan, Blitar city, and Madiun city. *Third*, the potential industries were existed in the Gresik regency. *Fourth*, the underdeveloped industries were discovered in the regencies of Pacitan, Trenggalek, Malang, Situbondo, Bondowoso, Probolinggo, Mojokerto, Kediri, Jombang, Madiun, Ponorogo, Magetan, Bojonegoro, Tuban, Lamongan, Sampang, Pamekasan, Sumenep, Malang city, Probolinggo city, Pasuruan city, Kediri City, and Mojokerto city.

3.1.8. Transport Equipment, Machinery & Fittings Industry

Another important field is transport equipment, machinery & fittings industry, where the researcher could distinguish the clusters as follows: *First*, the prime industries were found in the regencies Pasuruan, Sidoarjo, Madiun city, and Pasuruan city. *Second*, the growth industries were located in the regencies of Malang, Jember, Mojokerto, Ponorogo, Magetan, Madiun, Bojonegoro, Sampang, Blitar city, Malang city, and Batu city. *Third*, the potential industries were existed in the Gresik regency and Surabaya city. *Fourth*, the underdeveloped industries were discovered in the regencies of Pacitan, Trenggalek, Tulungagung, Blitar, Lumajang, Banyuwangi, Situbondo, Bondowoso, Probolinggo, Kediri, Jombang, Nganjuk, Ngawi, Tuban, Lamongan, Bangkalan, Pamekasan, Sumenep, Probolinggo city, Kediri city, and Mojokerto city.

3.1.9. Other goods industry

Other goods industry was also able to be classified as follows: *First*, the prime industries were found in the regencies Ponorogo, Madiun, Ngawi, Sidoarjo, and Surabaya city. *Second*, the potential industries were located in the regencies of Gresik, Tuban, Magetan, Trenggalek, Kediri, Jombang, Malang, Probolinggo, Sampang, Pamekasan, Sumenep, Probolinggo city, and Blitar city. *Third*, the underdeveloped industries were discovered in the regencies of Pacitan, Tulungagung, Blitar, Lumajang, Jember, Banyuwangi, Situbondo, Bondowoso, Pasuruan, Mojokerto, Nganjuk, Bangkalan, Malang city.

3.2. The Factors of Manufacturing Industry Cluster formation

The objective of this analysis is to provide beneficial consideration in determining the new industrial clusters location. Further, the researcher employed binary logistic regression as the instruments to figure out the factors of cluster formation. Binary logistic regression is a regression model where the dependent variable is the probability of getting two or more outcomes based on nonlinear function of a linear combination of a number of independent variables or predictors. The model in this study is:

$$D_{Ind} = \beta_0 + +\beta_1 X_{1rt} + \beta_2 X_{2rt} + \beta_3 X_{3rt} + \beta_3 X_{4rt} + e_{rt}$$

where D_{Ind} is a dummy of industrial areas (1 is industrial area, 0 is non-industrial area); X_1, X_2, X_3, X_4, respectively, are labor costs (wages), export orientation (exports), the amount of output (output) and the competitiveness index (IDS).

The results of estimation for 456 observations during 1970-2012 in East Java by using logistic regression showed that the dummy industry dependent variable with the explanatory variable, namely labor costs, output, exports and IDS proved to be statistically reliable. The evident could be seen from the Chi-square (4, N = 456) = 62.932 that significant with p> 0,00. These results indicated that a number of explanatory variables were able to distinguish industrial and non-industrial areas convincingly.

The ability to predict the model proved to be very convincing with a total success rate of 78.3%, with a percentage of 93.2% for non-industrial areas and 44.8% for the industrial area. Thus, all of independent variables can be relied upon to predict the industrial and non-industrial region.

Labor costs (WAGES) that are positive and significant indicated that the increase in labor costs will lead to further concentration of industry in the areas of industry. The positive and significant magnitude of the output (OUTPUT) indicated that the increase in the amount of output will lead to further concentration of industry in the areas of industry. Orientation export (EXPORT) that is positive and significant indicated that the high export orientation will lead to further concentration of industry in the areas of industry. In addition, the positive and significant Competitiveness Index (IDS) at α: 1% indicated that the strength of the high competitiveness of the region would lead to further concentration of industry in the areas of industry.

The results of binary logistic regression analysis showed that, among four predictor variables, Regional Competitiveness Index was the one that has the lowest (1%) error rate (α) significance level. Hence, it can be concluded that the main variable that will be taken into consideration for determining the location of the development of new industrial clusters for each type is the Regional Competitiveness Index variable.

3.3. Selection of New Industrial Clusters

Based on the results of analysis, the determination of the location of new industry cluster development should consider two things: the typology of leading industry and the regional competitiveness index. Therefore, before deciding the location, it is very important to analyze first the index of competitiveness of each region in East Java. The regional competitiveness index will be calculated based on three aspects: (1) the strength of the region; (2) public services; and (3) the investment climate. The results of calculation can be seen in the following figure.

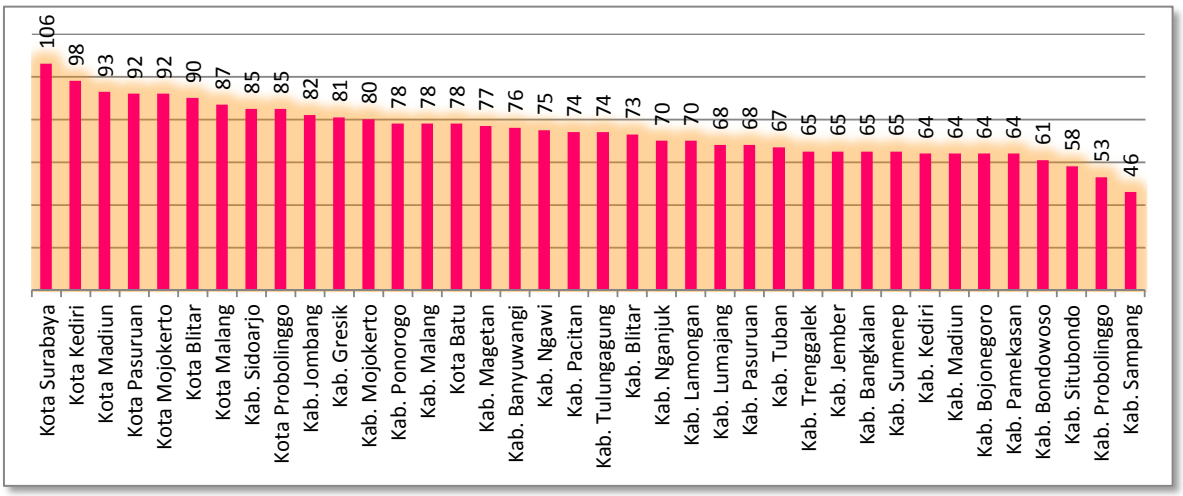

Figure 1. Level of Competitiveness among Regencies / City of East Java Province

In general, there is an obvious difference between the regencies and cities; city has high level of competitiveness compared with regencies. Regencies with problems of public services access, regional strength, and regional competitiveness will have a lower level of competitiveness. Moreover, it is clear that the industrial areas located in the city, have higher competitiveness level where the first rank is Surabaya City, second rank is Kediri City, and the third rank is Madiun City. By demonstrating the well ability of public services access, regional strength, and competitiveness due to the availability of infrastructure, spreading economic growth, as well as the attractiveness of the population to live in urban areas; the above competitiveness ranking will be an advanced reference for the development of new industrial clusters in East Java.

3.3.1. Industrial Cluster Development of Food, Beverages and Tobacco

Based on the results of the analysis of the typology and the regional competitiveness index, the development of a new cluster for the food, beverages, and tobacco industry was recommended in two regencies i.e. Jombang and Tulungagung.

3.3.2. Industrial Cluster Development of Textile, Leather Goods, and Footwear

The results of the analysis on the typology and the regional competitiveness index suggest that the development of a new cluster for textiles, leather goods and footwear industry should be concentrated in three regencies, they are Madiun, Malang and Banyuwangi.

3.3.3. Industrial Cluster Development of Wood & other Forest Products

The analysis showed that Kediri and Jember Regency are the prospective areas for industrial cluster development of wood & other forest products.

3.3.4. Industrial Cluster Development for Paper and Printed Matter

Another results of the analysis of the typology and the index of regional competitiveness, the development of a new cluster for the Paper and Printing industry recommended the concentration in three regencies, namely: Gresik, Ngawi, and Malang.

3.3.5. Industrial Cluster Development of Fertilizer, Chemical, and Rubber Goods Industry

It is suggested to develop the new industrial cluster of Fertilizer, Chemical, and Rubber Goods Industry in Madiun and Situbondo regencies.

3.3.6. Industrial Cluster Development of Cement and Non-Metallic Minerals Goods

Based on the results of the analysis of the typology and the regional competitiveness index, it is better for the development of a new cluster for cement and non-metallic minerals to be centered in Probolinggo and Madiun regencies.

3.3.7. Industrial Cluster Development of Basic Metals, Iron, and Steel Industry

Based on the results of the analysis of the typology and the regional competitiveness index, it is advisable to develop a new cluster for basic metals, iron, and steel industry in Blitar and Banyuwangi regencies.

3.3.8. Industrial Cluster Development of Transport Equipment, Machinery & Fittings

It is recommended to develop a new cluster for transport equipment, machinery & fittings industry Madiun and Malang regencies, since the analysis of typology and the regional competitiveness index showed positive results.

3.3.9. Other Goods Industry Cluster Development

The results of the analysis on the typology and the regional competitiveness index revealed also that Pamekasan and Kediri are the suitable regencies for the development of a new cluster for the other goods industries.

4. Conclusion

The results of the analysis summed up some findings: (a) there are two recommended new cluster development for the food, beverages, and tobacco industry; (b) there are three recommended new cluster development for textiles, leather goods, and footwear industry; (c) there are two recommended new cluster development for wood and other forest products industry; (d) there are three recommended new cluster development for paper and printing industry; (e) there are two recommended new cluster development for fertilizers, chemicals, and rubber products industry; (f) there are two recommended new cluster development for cement and non-metallic minerals goods industry; (g) there are two recommended new cluster development for basic metal, iron, and steel industry; (h) there are two recommended new cluster development for transport equipment, machinery & fittings industry; (i) there are two recommended new cluster development for other goods industry.

Nevertheless, a strategic policy is essential to be implemented for the development of clusters, such as: (1) Institutional aspect consists of: (a) Establishment of authority cluster development agency; (b) Provision of "supply-demand" information systems related to the business; (c) Establishment of accommodative institution for raw material suppliers in order to facilitate them access the capital, inputs, technology, and product marketing. (2) Infrastructural aspects consists of: (a) Prioritize the realization of infrastructure and transportation facilities in the cluster area; (b) collective agreement among the regencies / cities that are involved in the provision of infrastructure as the responsibility of the regencies / cities; (c) a government common policy (MoU) of regencies / city concerning on leading varieties as the industrial raw materials suppliers.

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